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EXAMINER	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/667,491
Filing Date: September 23, 2003
Appellant(s): SHEFFIELD ET AL.

Thomas Anderson
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed February 23, 2009 appealing from the Office action mailed October 21, 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US patent 4959507	Tanaka et al.	September 25, 1990
US pub 2002/0155021	Nagai et al.	October 24, 2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 2, 4-6, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Tanaka et al. (US patent 4959507).

Regarding claim 1, Tanaka et al. teach a method for forming a bonded ceramic-metal composite substrate, the method comprising the step of: providing a layer of the circuit board 1 having the conductive circuit trace 2 (figure 1) on a surface thereof; and reducing a surface roughness (column 2 lines 23-35) of at least one surface of the conductive circuit trace on the surface of the circuit board layer. The method of Tanaka et al. would inherently improve the performance of a signal transmitted via the conductive circuit trace, since the surface roughness of the copper element 2 is reduced. Furthermore, Tanaka et al. teach that the median surface roughness of the copper circuit sheet be not greater than 1 μm, or equivalent to about 254 microinches, and a maximum surface roughness be not greater than 8 μm, or equivalent to about 387 microinches (column 3 lines 9-12).

Tanaka et al. differ from the instant claim in that the reference does not explicitly teach the narrower range of roughness of the instant claim.

However, the range of roughness of Tanaka et al. (a surface roughness of no more than 254 microinches) encompasses the range of roughness of the instant claim (a surface roughness of no more than 20 microinches). Therefore, this encompassing range of roughness of Tanaka et al. is prima facie obviousness over the range of the instant claim. According to MPEP 2144.05, "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a

prima facie case of obviousness." *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also *In re Harris*, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005).

Regarding claim 2, Tanaka et al. teach wherein the step of reducing the surface roughness includes mechanical polishing the at least one surface (column 4 lines 59-64).

Regarding claims 4-5, the ground of rejection of the instant claims parallel that given above in claim 1.

Regarding claim 6, Tanaka et al. teach wherein the at least one surface of the conductive circuit trace includes one of a group consisting of: a surface parallel and distal to a surface of the circuit board; a surface parallel and proximal to the surface of the circuit board; and a surface perpendicular to the surface of the circuit board (figure 1).

Regarding claim 19, Tanaka et al. teach wherein the conductive circuit trace is formed on the surface of the circuit board layer 1 (figure 1).

Regarding claim 20, Tanaka et al. teach wherein the conductive circuit trace 2 is bonded (i.e., affixed, column 3 lines 56-60) to the surface of the circuit board layer 1.

Claims 1, 2, 4-6, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (US patent 4959507) in view of Nagai et al. (US pub 2002/0155021).

Regarding claim 1, Tanaka et al. teach a method for forming a bonded ceramic-metal composite substrate, the method comprising the step of: providing a layer of the circuit board 1 having the conductive circuit trace 2 (figure 1) on a surface thereof; and reducing a surface roughness (column 2 lines 23-35) of at least one surface of the conductive circuit trace on the surface of the circuit board layer. The method of Tanaka et al. would improve performance of a signal transmitted via the conductive circuit trace, since the surface roughness of the copper element 2 is reduced. Furthermore, Tanaka et al. teach that the median surface roughness of the copper circuit sheet be not greater than 1 μm, or equivalent to about 254 microinches, and a maximum surface roughness be not greater than 8 μm, or equivalent to about 387 microinches (column 3 lines 9-12).

Tanaka et al. differ from the instant claim in that the reference does not explicitly teach the narrower roughness range of the instant claim.

Nagai et al. teach that "[l]arge surface roughness of a copper foil results in the skin effect such that the current of electric signal having 1 GHz or more of frequency locally flows only on the surface of a coil. As a result, the impedance increases and the transmission of high-frequency signals is seriously influenced. Fine surface roughness is, therefore, necessary for conductive material used in a high-frequency circuit. The present inventors examined the relationship between the surface roughness and the high-frequency performance and discovered that 2 micrometer or less of surface roughness [or equivalent to about 97 microinches] in terms of the terms of the ten-point average surface-roughness (Rz) attains the desired high-frequency performance. The fine roughness can be provided by means of producing a wrought copper foil or electro-

deposited copper foil under appropriate conditions, or chemically or electrolytically polishing the surface of a copper foil" (paragraph 28).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a smaller surface roughness in the copper sheet of Tanaka et al., because a smaller surface roughness would improve the high-frequency performance of the device by reducing the impedance, as taught by Nagai et al. (paragraph 28).

Regarding claim 2, Tanaka et al. teach wherein the step of reducing the surface roughness includes mechanical polishing the at least one surface (column 4 lines 59-64).

Regarding claims 4-5, the ground of rejection of the instant claims parallel that given above in claim 1.

Regarding claim 6, Tanaka et al. teach wherein the at least one surface of the conductive circuit trace includes one of a group consisting of: a surface parallel and distal to a surface of the circuit board; a surface parallel and proximal to the surface of the circuit board; and a surface perpendicular to the surface of the circuit board (figure 1).

Regarding claim 19, Tanaka et al. teach wherein the conductive circuit trace is formed on the surface of the circuit board layer 1 (figure 1).

Regarding claim 20, Tanaka et al. teach wherein the conductive circuit trace 2 is bonded (i.e., affixed, column 3 lines 56-60) to the surface of the circuit board layer 1.

(10) Response to Argument

On pages 9-10 of the Appeal Brief, the appellant argues that the range of roughness of Tanaka et al. of no more than 254 microinches is significantly larger than that of the instant claims, which recites no more than 20 microinches, and the appellant alleges that this narrower range is an unexpected result since a narrower roughness reduces the "skin effect" in a high-frequency device. While Tanaka et al. does not explicitly disclose the roughness in relation to the skin effect, the range of roughness of Tanaka et al. of "no more than 254 microinches" encompasses the range of roughness of the instant claims. As noted in the previous office action, this encompassing range of roughness of Tanaka et al. is prima facie obviousness over the range of the instant claim. According to MPEP 2144.05, "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also *In re Harris*, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005).

The applicant's argument that the narrower of the instant claims is an unexpected result is found to be unpersuasive, because Nagai et al. teaches that a high surface roughness adversely affects the performance of a high-frequency device and that the desired performance is achieved with a roughness of less than 2 μm (paragraph 28), or about 97 microinches. Therefore, surface roughness is a cause effective variable, and since Nagai et al. teaches that lower roughness yields better performance, it would have been obvious to one having ordinary skill in the art at the time the invention was made

to have reduced the surface roughness as much as possible through routine experimentation in order to optimize the performance of the high-frequency device, as suggested by Nagai et al.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Luan V Van/

Examiner, Art Unit 1795

Conferees:

/Nam X Nguyen/

Supervisory Patent Examiner, Art Unit 1753

/Jennifer Michener/

Jennifer Michener

QAS, TC1700